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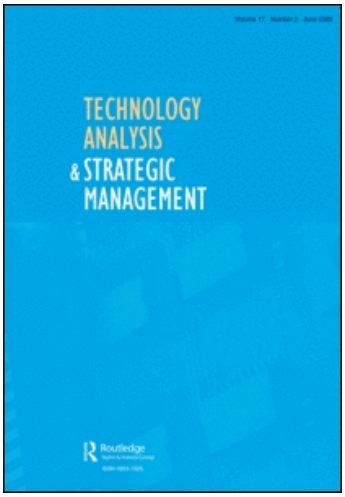

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Frans Berkhout[a]
[a] Institute for Environmental Studies (IVM), Vrije Universiteit, Amsterdam, The Netherlands

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Normative Expectations in Systems Innovation

FRANS BERKHOUT

Institute for Environmental Studies (IVM), Vrije Universiteit, Amsterdam, The Netherlands

ABSTRACT *This paper is concerned with the way technological expectations are generated, articulated and deployed in processes of large-scale socio-technical change. We argue that expectations are intrinsic to all social action, so that visions of the future are both ubiquitous and context-specific. Agents will act in relation to private visions of the future that are complexly related to shared or collective visions. Characteristic features and forms of visions as they relate to socio-technical regimes are identified, and the specific roles visions play in the context of actor networks engaged in processes of systems innovation are discussed. Visions are seen as 'bids' that are deployed by actors in processes of coalition-formation and coordination. Examples from a range of visions of more sustainable systems are used to illustrate the main arguments. The paper ends by discussing the normative features of socio-technical expectations.*

Introduction

Expectations are inscribed into all social and political action, just as history is. It is not possible to act without making assumptions about the consequences of that act, explicitly or tacitly. This is especially the case for activity that sets out to be innovative, where the intension is to act on the world and to change it. This does not mean that the 'possibility space' is unconstrained. Expectations are manifest in the present-day order of things, being reflected for instance in relative prices and values. Future behaviours are therefore already anchored in some senses by expectations of those same behaviours.

In much contemporary analysis, expectations are typically subordinated within concepts of risk and uncertainty. These point to our (lack of) knowledge about the future, and in particular knowledge of futures over which there may be some control, individually or collectively, but they seem to ignore the more purposive, functional and active ways in which social actors seek to construct, make sense of and shape their futures by making them more concrete in the form of images and visions. This process of representing images of the future is not, in general, done in a disinterested way. At stake are attitudes and interests in the present—what Michael terms the 'performative' aspect of expectations.[1]

Correspondence Address: Frans Berkhout, Institute for Environmental Studies (IVM) Vrije Universiteit, De - Boelelaan 1087, 1081 HV Amsterdam, The Netherlands; Tel: +31 20 598 9525; Fax: +0031 20 598 9553. E-mail: frans.berkhout@ivm.vu.nl

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The recent literature on 'transition management', which is concerned with shaping and coordinating large-scale system innovation towards greater sustainability, has placed a great deal of importance in the role of 'guiding visions'.[2] These visions are seen as devices for specifying a desired end-state in the form of a particular socio-technical regime (urban mass transit systems, for instance), supported by an effective 'coalition of the willing', around which processes of technological, institutional and behavioural change can be guided and motivated. Much is made of the processes of adaptive learning that may influence the specific trajectory of change towards this goal, but the collectively endorsed vision of the end point of the transition process remains crucial.

This paper is concerned with the way technological expectations are generated, articulated and deployed in processes of socio-technical change. We argue that because expectations are intrinsic to social action, visions of the future are ubiquitous, but individual and specific. Agents will act in relation to their private version of what the future may hold. As programmes of action unfold and practices are modified, so these private agendas for the future change, usually tacitly. However, private expectations are to a large extent shaped by socially distributed rhetoric about the future, as well as by the inertias represented by material conditions. Shared visions have a specific set of functions in aligning interests and framing problems, have a common structure and take characteristic forms. We further argue that, to give them force, visions of the future tend to be 'moralised', in the sense of being encoded and decoded as either utopias or dystopias. This is because the possible effects of different visions are socially distributed (there will be winners and losers), and because one way of enrolling actors to a particular vision is to attach it to positive moral values, or to visualise the negative consequences of not pursuing it. Visions of the future that are consensual in the sense implied by transition management theorists therefore appear to be atypical. Instead they should be seen as resources deployed by agents in pursuit of private or sectional interests.

Given the importance of visions of the future to processes of modernisation,[3] a variety of means for articulating and distributing visions exist, and these may be seen to proliferate through time.[4] That is to say, substantial resources, technological and institutional, are devoted to the problem of realising and transmitting visions of the future. We present an analysis of how these resources are deployed by members of a socio-technical regime in pursuit of their interests in processes of change. On such an analysis, collectively-held visions of regime transformation emerge from within configurations of resource-dependent actors seeking to enrol other actors in their strategies. Visions therefore do not have the meta-existence implied by the transition management model, but are functional to actors seeking to '... marshal resources, coordinate activities and manage uncertainties'.[5] Because it is likely that dominant and incumbent actors will be the most effective at defining and diffusing future visions, there may be a role for the support of alternative, more weakly defined and distributed visions.

The paper is organised in three sections. The first sets out some characteristic features and forms of visions as they relate to socio-technical regimes. The second explores the specific roles of visions and the way in which they are deployed in the context of actor networks engaged in processes of systems innovation. The third section deals with the means by which visions are generated, articulated and adopted. The paper ends with some speculations about the normative features of socio-technical expectations.

Expectations as Framing and Moralising Systems

There has long been an interest in communicable images that come to represent a body of ideas about individuals or communities. Lippmann[6] saw the images used in propaganda and in advertising as 'pseudo-facts' that guided behaviour. Boulding[7] regarded the image '... as a cognitive knowledge structure, a schema' that was handed down as a 'transcript' of the essential characteristics shared by individuals participating in a group. Lakoff and Johnson[8] argued that images represented a metaphorical structure consistent with underlying values. Bartlett,[9] discussing the psychology of memory, introduced the notion of schema as an organised structure of knowledge into which new knowledge and experience might fit. This seminal idea of a learned 'frame' or 'script' has been influential across a wide range of fields, from artificial intelligence[10] and communication theory[11] to educational psychology.[12] In all these cases, the image, frame or schema is seen as functional to interpretation, sense-making and problem-solving by social agents, and to establishment and maintenance of cohesion and order of social groups. They are a means for reconciling experience with knowledge, while at the same time being grounded in the social and institutional frames within which agents act.

These insights have more recently been applied to the role of expectations about the future.[13] It is widely accepted that expectations influence the attitudes and behaviour of social agents, and that they can take the form of schemata and representations of these schemata.[14] In so far as images of the future take the same form as images of the present and are to some extent modifications of images of the present, we need to see expectations as relational objects. They are representations either of things remaining the same, or of things changing. In this sense they are always referenced to attitudes and perceptions about the present order of things. At least part of the function of visions is to endorse or to criticise the present. Indeed many visions of the future are generated with the sole purpose of justifying change in the present. Visions are therefore used to anticipate and to rationalise change.

Numerous studies have been done on differing and conflicting expectations in specific technological fields, including genomics and biotechnology, ICTs, nanotechnology and so on. These studies demonstrate the variety of expectations that can co-exist and point to the failure of many expectations to be realised,[15] but it may be a mistake to read expectations too literally. We have already drawn a distinction between private expectations (that may be held but not necessarily communicated) and public or collective expectations (that are communicated and shared). It is these collective visions that are of analytical interest because a private expectation, which remains private, is not likely to be socially significant, even it is held by a powerful social actor, but even collective expectations often do not acquire the capacity to align behaviour and motivate action.

Instead it may be more productive to see expectations as 'bids' about what the future might be like, that are offered by agents in the context of other expectation bids. Expectations offer a potentiality that in most circumstances requires the endorsement and affiliation of other actors before it can be actualised. It is therefore a feature of expectations that those that are successfully adopted and diffused will be flexible. This means that their modification in the process of adoption by other social actors is also typically already anticipated by the bidder. Without this interpretive flexibility it will be difficult for a vision to succeed in enrolling new adherents and advocates, because to be adopted by a new adherent, a vision would need to be matched to a new set of interests and a

new (and in part private) image of the present. In this sense, no one proposing a vision of the future (an expectation bid) will normally believe that their vision will be fully realised. Bidders will also typically anticipate the need for some further elaboration of a vision. They are also aware that they are only one of a population of bidders, each with a somewhat different vision of the future.[16] So expectations remain malleable and open to reinterpretation until the point at which they are realised in some form. Even after this point they may be expected to undergo change, because the battle over expectations is never complete.

One of the problems of analysis is that expectations, schemata, images and visions appear to take a huge variety of forms. They may include entirely private, tacit and unformulated phenomena, or visualised, disseminated and debated ideas about the future. They may be narrow technical parameters (such as the Moore's Law prediction about the functional capacity of memory chips), or wholesale narratives of alternative worlds (such as Ridley Scott's *Blade Runner*). No clear distinction is often made between what may constitute an option, and what is truly an expectation. The notion of an expectation implies some form of commitment to a future possibility, and something in respect of which agents may be responding or adapting.[17] Just because something has been expressed as a possibility (an option), does not mean that it has achieved the status of an expectation. Once it succeeds in becoming an expectation through the accrual of private and collective commitments, it also comes to embody the interests of those actors, who pursue it by embedding it in their behaviour and problem solving. In this form, an expectation becomes instrumental to the heuristics of social actors, in the sense of shaping their diagnosis of problems and their search for solutions. Some expectations become so widely shared that they acquire a normative force, in the sense of being expressed as an entitlement. For instance, most workers expect to have a pension when they retire. At that point expectations cease to be malleable and become facts that predictably influence present-day behaviour, and so become self-fulfilling.

Taking into account the discussion so far and seeking to encourage more accuracy in the use of the notion of expectations expressed as images in relation to the debate on socio-technical change, we tentatively propose a definition of a future visions as: *collectively held and communicable schemata that represent future objectives and express the means by which these objectives will be realised*. Under this definition Moore's Law alone would not qualify as a vision (because it represents an objective alone), but would need to be supplemented with a proposal for how improvements would be achieved. *Blade Runner* clearly does qualify, although it represents a particularly densely worked notion of a schema. Most visions will fall somewhere between a technical parameter at one end and a sci-fi morality play on the other.

Beyond this definition, we want to suggest that future visions have three characteristic features: *objectives*, the qualitative or quantitative expression of novel future outcomes; *orders*, a set of social and institutional relationships in which these objectives can be met; and *technologies*, the means for achieving objectives. In making these distinctions, we also want to show that future visions embed technologies in an institutional and moral universe, and are therefore consistent with ideas about the co-evolution of technologies and institutions.[18]

One way of illustrating this argument is by discussing utopias.[19] Utopias represent examples of radical and more fully worked visions of the future. Their aim is to '... break the bonds of the existing order',[20] to exemplify an alternative order and to inform

collective action in pursuit of that order. Levitas[21] and Davis[22] have argued that utopias are a response to socially experienced gaps between the expectations (in the normative sense) of certain marginal groups and the conditions that they experience. In the 1970s, perceived gaps with the natural world, with grounded community identities, and with fulfilling work and leisure, produced a range of expressions of ecological utopias.[23]

Figure 1 shows an expression of this utopia: one of Clifford Harper's illustrations of urban farming.[24] The vision expresses an objective (small-scale, organic, low-impact urban agriculture), it represents an order (a cooperative, locally-embedded and community-based production-consumption) and it suggests technologies that may be involved in realising this order (in this case mostly conventional low-tech garden tools). It is a coherent, highly layered conception that, as time has gone by, has come to seem both more and less plausible. It has proven to be a rich source of ideas, arguments and inspiration for environmentalists, and arguably many of its foundational objectives and technologies were co-opted by agro-environmental policies and corporate strategies (organic food production) during the 1990s, but without the utopia being realised.

The vision also illustrates a set of political and ethical values of stewardship, equity and participation, and so can be said to be *moralised*. This is another recognisable feature of visions of the future, which are typically organised around a positive/negative or utopian/dystopian dualism. The function of these constructions is to position actors with respect to the vision. Proponents of a vision appear to be seeking to ground a vision of the future by giving it a moral charge, and linking it to foundational notions like 'progress' or 'hope'.[25] This is a way of making it more accessible or attractive to others to whom the vision of being communicated. In addition, and perhaps more importantly, the moralised vision becomes the object around which

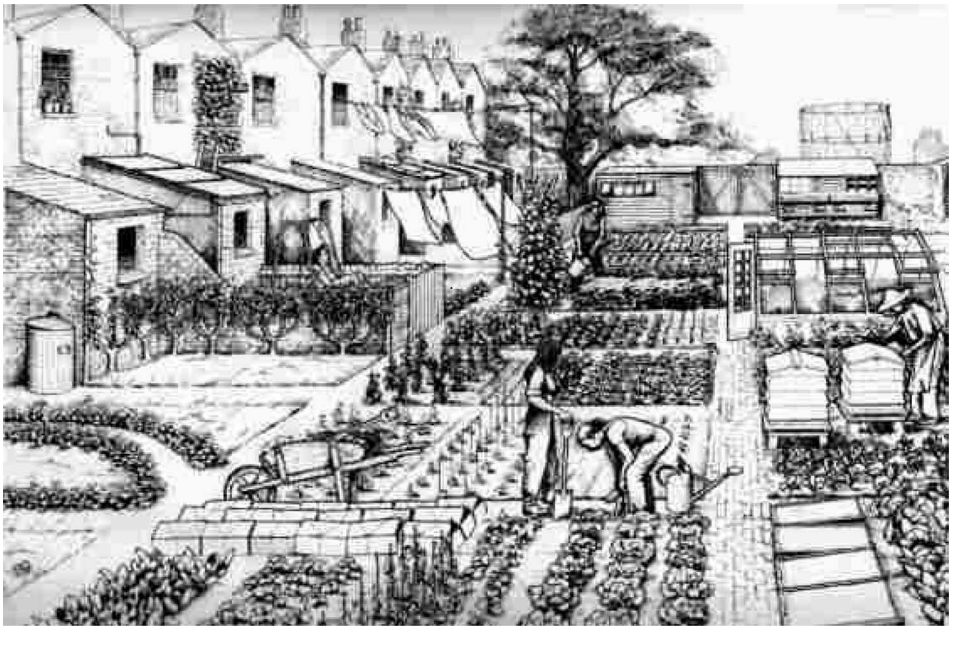

Figure 1. Vision of urban farming (see Boyle & Harper, Ref. 23).

social interests can be arranged—with 'pro' and 'anti' groups being crystallised out. The history of technology is littered with contests around alternative visions of a technological future, explained, at least in part, by their positioning within a binary moral structure. Ironically, one of the primary functions of visions therefore can be to frame dissensus, rather than to generate consensus.

By using this example, we do not want to argue that all visions need to be quite as densely elaborated as ecological utopias of the 1970s. The detailing of a vision is not the important thing. What counts is the existence of the characteristic features we have identified. Nor should the lack of evidence that a vision has been realised (as with ecological utopias) be regarded as a failure. As Goodwin[26] argued: 'Utopias are often written, like allegories, to influence people's ways of thinking, and do not always demand the implementation of the utopian blueprint in toto ...'. The same counts for expectations, which we have argued constitute bids made by agents acting in the knowledge that they are conditional and flexible.

Visions in System Innovation

Socio-technical regimes are relatively stable configurations of institutions, techniques and artefacts—as well as rules, practices and networks—that determine the 'normal' development and use of technologies. Regimes thus embody strongly held convictions and interests concerning particular technological practices and the best ways in which these might be improved. A keen debate has recently developed about how change occurs in these stable configurations, and about whether these processes of change can be stimulated and steered in more sustainable directions.[27] A key role is often given to innovations that are developed outside incumbent, less sustainable regimes. These innovations are seen as developing in niches outside the mainstream, which progressively come to influence, modify and substitute the incumbent regime.[28]

With others, we have been concerned with introducing a less functionalist, more actor-based analysis of regime transformation that sees regime change as being motivated by resource-interdependent actor networks situated both within incumbent regimes and outside them.[29] We see regimes as facing selection pressures to which they respond by deploying resources in a more or less coordinated way. Regimes with sufficient adaptive capacity to respond will be sustained, albeit in a modified way, whereas those that cannot may be supplemented or replaced.

In these processes of regime transformation, future visions about the functions, order and means represented by the regime are extremely important. Regime members will align themselves to visions of the future that are aligned with their interests and which they believe they have the resources to achieve (or which they believe they can convince other powerful actors to achieve with them). While in stable regimes there are often dominant interests that direct the pace and direction of change, in regimes subject to effective selection pressures, relationships between such interests are put in tension and become disrupted. Under these circumstances, no single actor generally has the power to determine the direction of change. This also provides openings for dominant schemata about future developments to be challenged, with recursive effects on the perceptions and interests of other regime members, and of those outside the regime.

Visions therefore can be seen to play a number of specific functions in system innovations:

1. *Mapping a 'possibility space'*: Visions identify a realm of plausible alternatives for conceiving of socio-technical functions and for the means of providing for them.
2. *A heuristic device*: Visions act as problem-defining frames by pointing to the technical, institutional and behavioural problems that need to be resolved in order for a particular vision to be realised.
3. *A stable frame for target setting and monitoring progress*: Visions stabilise technical and other innovative activity by serving as a common reference point for actors collaborating on its realisation.
4. *Metaphors for building actor networks*: Visions specify relevant actors (including and excluding those who may play a role in realising a vision), acting as symbols, narratives and moralities that bind together communities of interest and of practice.
5. *A narrative for bringing together and focusing resources (capital, knowledge, networks, skills etc)*: Visions become emblems that are employed in the marshalling of resources from outside a core membership of actors already committed to a specific vision. Storylines about visions and expectations are important for the enrolment of different actors into coalitions for or against change.[30] Such storylines are renegotiated and reshaped for specific audiences and by specific circumstances. So, for instance, the vision of hydrogen-powered vehicles may be portrayed as an opportunity for large-scale biomass energy production to one audience, and an opportunity for coal gasification with carbon sequestration to another. The process of transformation itself is likely to force revisions to a vision. Indeed, the original vision may have been relatively vague and incoherent: simply an outline of a problem field, around which coalitions can begin to form. It is the process of system innovation that can begin to give the vision shape and body in terms of an envisaged configuration of artefacts and practices that work in a desired way and deliver certain outcomes.

The degree of interpretative flexibility in storylines, and the ease with which they can be matched to circumstances, can influence the cohesiveness and robustness of a coalition organised around a vision.[31] A degree of flexibility over the interpretation of a vision can widen its relevance to greater numbers of actors. However, too much flexibility can introduce interpretive instability and harm its capacity to coordinate and discipline the actions of social actors. Clearly, some visions and expectations will garner greater credibility and legitimacy than others. We do not properly understand the basis of this credibility—why some ideas seem to be more resonant at a given moment than others. Attention, credibility and enrolment can derive from the influence and standing of the interests that constitute the vision (i.e. the membership of its supportive coalition). Or credibility can derive from the intrinsic validity and appeal of the vision itself, and the emergence of a belief among separate constituencies that a vision is 'of its time'. The cultural and political context in which a vision is propounded therefore determines whether it comes to be recognised as an image around which agents with effective power chose and come to be organised.

A vision backed by a key government department, or a large multinational corporation, may have greater chances of attracting adherents than a radical vision put forward by, an environmental group. Alternatively, the track record of those backing a vision might taint its credibility. Visions transparently promoted to achieve sectional interests may not

succeed in arenas where dense resource interdependencies between actors exist. Even where a dominant single interest exists, there will be a risk of 'overstretch' if a vision runs counter to the zeitgeist, or interests of too many other agents. In other words, the kinds of supporter enrolled in a coalition can be a source of credibility, depending upon who is doing the backing and who is assessing its credibility. Visions contain implicit (or explicit) ideological assumptions (e.g. over the way problems are framed), and these will colour their attractiveness to different audiences.

Effective visions are those that achieve the right balance between the utopian and the aspirational, and the grounded and realistic, and in doing so do not appear too aligned to current interests and capabilities. They can function if they are seen to be open to the enrolment of (and perhaps reinterpretation by) new agents and their resources. Too much incongruity takes a vision further into the realms of utopia. Any vision, if it is to be plausible, and thereby begin to attract credibility, must recognise the material and social structures against and within which it is acting; the vision must include a realistic set of strategies and tactics for challenging those structures; and it will need to offer believable processes of cause and effect in the solution of identified problems and the delivery of expected benefits.

At times, when the normal functioning of an incumbent regime is problematic or under stress (global fossil fuel-based energy systems, for instance), peripheral members or outsider actors may be able to intervene with their ideas to greater effect. Stress can place in doubt long-established expectations about regime functioning, and consequently provide space for alternative visions and expectations about how a regime *ought* to satisfy the relevant human needs. Under such circumstances, criticisms of regime effectiveness or function appear more reasonable, and debate can be fruitfully opened up. At other times, when regimes are not under such stress, such opening up is more difficult and there will be less opportunity for alternative visions to attract adherents. Indeed, the way regimes service social and economic functions can serve to close down the scope for alternative visions and configurations.

The Generation, Articulation and Diffusion of Future Visions

An analysis of visions as schemata that are communicated by social actors in pursuit of their interests means that we are less interested in the content of specific visions (texts, images, narratives, models, simulations), than in the way in which they are generated, articulated and diffused. Here we can start from some first principles. If all social action requires an expectation about its future consequences, then we can see that the generation of visions and expectations is an intrinsic, continuous and everyday fact in social life. All social actors contend with multiple visions of the future, each matched to different areas of their activities and beliefs. Actors may seek to reconcile these images, but in many cases it may be possible to maintain a number of irreconcilable images of the future.

We have also argued that private visions connect with shared, collective visions in the form of schemata. These schemata can be mobile and contingent, being influenced continually, and often tacitly, by experiences and other types of new knowledge. They begin to stabilise when experience and other knowledge begins consistently to be aligned with the vision. In this way we can also see that there is an interaction between private and collective visions. Collective visions come to influence the frames and interests of agents, but only in so far as they are aligned to certain predispositions in private schemata and are consistent with privately interpreted experience. Inconsistencies between collective

visions and experience and knowledge will lead to a reconsideration of its validity or its modification.[32] Generalising, we may argue that what is true of individual agents may also be true of organisations, in the sense that the collective vision of an organisation is something that is shared by members of that organisation, but which is also interacting with the private visions of people working within the organisation.[33]

The boundaries between the private and the shared aspects of visions are fuzzy and, for most actors, difficult to define. The transactions across the boundary, between private and shared, may also go unnoticed and become hard to trace. Individually, we are only vaguely aware of the ways in which we are influenced by shared visions of the future. Part of the reason for this is that expectations (just as other forms of knowledge) are experienced in a variety of overlapping and interpenetrating forms—tacitly, explicitly and in codified form. There is no simple or predictable relationship between the forms in which these forms are generated and sustained.

Shared visions, by definition, must be codified in some way in order to be communicable. As we have seen with the example of eco-utopias, these can be highly elaborate. Others may constitute only sketches. What seems important is that, as with private visions, there are multiple sources of collective visions that confirm, contradict and influence each other. These sources may include art and literature, public and political discourses, statements and appeals from business, civil society and government. Metaphors and rhetorics from one set of discourses will come to be used in the framing and disputation of others. All social groups will have shared expectations and visions, and these will seek in some way to compete as expectation-bids with the expectations and visions of other groups.

In making this claim about the plurality of sources of shared visions, we need to make a distinction between what might be termed 'single-source visions' and 'multiple-source visions'. Single-source visions are those that are generated by *visionaries* with the intention to instruct or entertain. In the environmental field, an example of this might be James Lovelock's Gaia Hypothesis, which makes a claim about how life on earth has shaped atmospheric and ecological systems, and also suggests a particular interpretation of environmental crisis and the correct responses to it. Other examples of single-source visions may be company strategies and visions that are propounded deliberately to orient, discipline and evaluate behaviours in the organisation. It is likely that the majority of expectations that come to be shared originate as single-source visions that are more widely appropriated in the pursuit of sectional interests.

Multiple-source visions, however, originate in structured social processes of the *making explicit* of possible futures. Examples of these processes might include synthetic foresighting procedures designed to inform research and technology policies, or 'transition arenas' designed to inform system innovation. To the extent that these procedures are becoming more commonplace, we could argue that they exist in order either to legitimate, or to act as a counter to the single-source visions of the future generated by industrial, scientific and governmental interests. The operational problems faced by these exercises are related to our very imperfect understanding of the ways in which shared understandings actually emerge and about how they can then be sustained. A shared vision developed at a foresight workshop soon becomes so much background noise in the face of the exigencies of alternative expectations more firmly rooted in commercial, institutional and political interests. In addition to these procedural challenges, the problems of legitimacy faced by these exercises may be interpreted as flowing from the question of how far sectional single-source visions come to dominate and co-opt them. Foresight exercises often struggle to

show that their imperfectly generated synthetic visions can compete successfully with the more potent and honed interest-based visions of their participants.

From this discussion we can draw out some tentative conclusions about the diffusion of expectations and visions. First, many visions of the future (private and shared) compete for attention, validation and acceptance. We have argued that modernising societies are promiscuous in their generation of future visions (partly because this is functional to the ideas of progress and modernisation), and that new social procedures have developed that act as new sources for these visions. Most visions fail to compete successfully and are ignored, forgotten or shelved, perhaps to reappear another day. The visions of a hydrogen- or nuclear-powered future are examples of dormant visions that have come to be revived.[34]

Second, we may say that, in broad terms, there are two kinds of explanations for the successful articulation and diffusion of a vision: its validity or attractiveness to a wide range of interests; and/or the power of the constitutive interests who dominate a discourse about alternative futures. In these two cases what is different are the terms under which new adherents are enrolled to the vision. In one there is a process of voluntary and empowered enrolment, in the other enrolment is in some sense involuntary or even coercive. This may be because a deliberately constrained set of options have been considered, or because the capacity to realise future options has been disproportionately aligned with one particular future option.

Third, we predict that in almost all cases the process of diffusion will lead to modifications to the vision, as it is fitted to a wider set of private and shared visions, and as experience about what is feasible is accumulated in the implementation of the vision. As we have argued, visions with greater interpretive flexibility will be better equipped to undergo this process of modulation. The same will be true the greater the flexibility of the coalition of constitutive interests advocating the vision. The process by which visions are modulated and recast by experience and by new knowledge is unstable and uncertain. There is no simple link between a vision's initial attractiveness, or the power of its original advocates, and its realisation. The history of technology is littered with dead-certs that turned into dead ducks (the nuclear fast reactor being a paradigmatic example[35]). However, there are also expectations that remain remarkably resilient, even in the face of contra-evidence. Two slightly provocative examples include the idea of space flight (first suggested by Kepler in the 16th century) and time travel (suggested by H. G. Wells over a century ago).

Fourth, we would argue that there are multiple tools available for the diffusion of visions, including rhetorics and metaphor, narratives and models. The full range of media may be deployed in processes of diffusion of visions. These tools will be used in concert, one supporting and feeding into another. We may speculate about whether one of the most novel uses of the new media are in their application in the articulation and diffusion of visions of the future, and so another feature of a more future-facing risk society. The expansion of modelling, visualisation, simulation and gaming across wide fields of assessment, design, planning and social deliberation are good examples of the panoply of technologies being applied to making future visions manifest, plausible and persuasive.

Conclusions: Normative Influences on Visions

Applying this analysis to the problem of system innovation suggests a rather different approach to the role of visions than has been proposed by the transition management

theorists. Indeed, we might question the usefulness of the notion of 'guiding visions'. To the extent that visions guide perceptions and behaviours it is a tautologous construction. Visions (and their associated expectations) are ubiquitous and one of their main roles is to motivate and coordinate present action towards the future. More seriously, we object to the idea that visions can achieve a status as valid social objectives that stand apart from the active social processes of generating, articulating and diffusing visions through social networks and coalitions. There is no doubt that some visions of the future do enrol a variety of social actors, act to stabilise social networks and, in special cases, become self-fulfilling prophecies. It is also likely that this process is a precondition for deep, systems innovations. But the visions that inform and become functional to these transformations are emergent features of the process of network and agenda-forming process, and exist only in relation to the interests that are connected through these processes. Visions do not have a separate existence outside these social processes of coalition formation and commitment, but features of those processes deployed by interested insiders and outsiders.

We want to make two tentative suggestions about normative influences on visions in processes of system innovation. The first is that in the process of being communicated, codified and shared, visions seek in some sense to create a *normative space* in which they can exist. We have argued that visions are typically moralised—effort is exerted by advocates to attach visions to widely shared values, or contrasted with undesired outcomes. This is necessary because novelty can only seem plausible if it has a chance of being widely accepted as good. If the innovation eventually does become diffused more widely, an equal and opposite process occurs in which, through a process of 'normalisation' it is emptied of moral content.[36] Second, while we have been concerned primarily with the expression of interests (and therefore of power), the broader adoption of visions will entail an appeal to broader collective values, such as progress, equity or humanitarian assistance. Large-scale socio-technical change needs to be rationalised as preserving or improving public goods (public health or the environment), precisely the sorts of values that may be becoming more fragmented and individualised in risk society. Appeals of this kind may be through a rhetorical modification of the vision, or through a pragmatic reworking of the vision to take account of the possible impacts that have been identified. The great danger is the plasticity and variety of symbols being manipulated to achieve future ends. The paradox is that the greater variety of visions of the future, more expertly rendered and disseminated, competing for attention, exists just as the stabilising influence of shared moral values appears to be becoming less effective.

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